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ABSTRACT

This resource book is designed to help educators use the Internet as a tool in the instruction of all students, including students with disabilities, auditory and visual learners, students from rural areas, and those who do not speak English as their first language. The handbook begins by identifying some common access strategies and multiple ways in which students can benefit from them. It then turns to practical models from teachers who have taken concrete steps to provide access to the Internet for all of their students. Six success stories are provided that describe: (1) helping students with learning disabilities through the use of "talking" computers; (2) integrating special education technology into the overall technology plan for a school district; (3) using e-mail and the Internet to build bridges between students with disabilities and students at other schools; (4) helping deaf and hard-of-hearing students develop literacy skills and vocabulary with a textbook available on the Internet; (5) integrating a student with a visual impairment into classroom activities using the Internet; and (6) using assistive technology to integrate students with disabilities and students for whom English is a second language. Resources for finding assistive technology and World Wide Web resources are listed. (AEF)

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THE INTERNET

An Inclusive Magnet for Teaching All Students

Betsy Bayha

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THE INTERNET:

An Inclusive Magnet for Teaching All Students

March, 1998

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WHY YOU SHOULD READ THIS

The World Wide Web, the information superhighway, cyberspace, the net: this global network of computers, databases, libraries, images and sounds brings new challenges and opportunities to education. This resource book is aimed at helping you use the Internet as a tool to educate all students in your classroom, including students with disabilities, auditory and visual learners, students from rural areas, those who do not speak English as their first language — in short, everyone.

Teachers who have used the Internet in their classrooms report benefits that reach beyond scholastic performance. Listen to Dorothy Leighty-Parks, a teacher from Milpitas High School in northern California who says motivation and attendance were twin problems for her students — until they got on the net. "The Internet is a high-status skill that motivates these students." Not only is attendance up, but Dorothy says when her students work on the Internet , "Their projects are superior to those they produce using only library resources."

"The Internet is a high-status skill that motivates these students."

–Dorothy Leighty-Parks

The Internet can also be an equalizing force. CAST, the Center for Applied Special Technology in Massachusetts reports that the Internet offers a strong potential to, "break down the barriers and inequities encountered by students of different socioeconomic, racial, linguistic and disability backgrounds."[1]

Schools across the country have been working to get on-line and provide training to teachers. But teachers and administrators have little hands-on information on how to address some of the challenges and barriers that arise in using the Internet with a diverse student body.

[1] Center for Applied Special Technology, "The Role of Online Communications in Schools: A National Study" Follansbee et al. 1995 page 2

HOW TO USE THIS HANDBOOK

The goal of this handbook is to provide simple, direct, concise and practical tips to help teachers assist all of their students in mining the riches of the Internet.

We start by identifying some common access strategies teachers can use and the multiple ways in which students can benefit from them.

Then we turn to practical models from teachers who have taken concrete steps to provide access to the Internet for all of their students. The key words at the top of the page are a guide to the central issues addressed in each story.

Please copy pages from this handbook and share them with others. Or visit our regularly updated website, and download a free copy:

http://www.wid.org/tech/handbook/.

GENERAL GUIDELINES FOR SUCCESS

Every teacher can create opportunities for all of their students to use the Internet successfully. Sometimes, the biggest barriers to Internet access are solved simply by planning ahead and making smart choices about which equipment and software to buy. Readily available add-on devices can also be used. Here are some general strategies to enhance access to the Internet.

STRATEGY	BENEFITS
Use a large monitor — at least 17 inches.	▸ Allows use of the computer for group learning. ▸ Allows font enlargement for users with low vision and those with learning disabilities. ▸ Provides large print on screen without the need to scroll down and across web pages for users with limited hand coordination.
Get a high-speed connection – at least 56 kbps (kilobits per second). **A high-speed telephone line such as an ISDN line or T1 line is preferable to a dial-up line.** **Some cable TV companies offer high-speed Internet access.**	▸ Downloads web pages faster, helps reduce frustration levels for students with short attention spans. ▸ Necessary for using Internet videoconferencing. ▸ Becomes more important as video and audio are "streamed" across the Internet for real-time transmissions.
Try a trackball as an alternative to the mouse.	▸ Helps younger students and those with limited fine motor skills. ▸ Helps children with limited coordination. ▸ Helps computer users with tremors or spastic movements. ▸ Can help to reduce repetitive strain injuries.

STRATEGY	BENEFITS
Provide "Assistive Technology" as needed to enhance access. For example, use touch screens, alternate keyboards, switches, head-mounted pointers, on-screen keyboards, word prediction software and voice input and output technology.	▸ Assistive technology is necessary to provide basic access to the Internet for some students with disabilities. ▸ Many students without disabilities also benefit from assistive technology. ▸ To learn more about assistive technology, or to find local resources, please see listings on page 18.
Set the computer font size within the web browser at 14-18 points or larger. **Set colors within browser to heighten contrast. (Black type on a yellow background provides the greatest contrast).** **Set the color of the hyperlinks to heighten contrast.**	▸ May help some students with learning disabilities such as dyslexia to read text more easily. ▸ Makes text more visible in group learning situations. ▸ Helps students with low vision see screen content more easily, though some may need a more powerful screen enlargement program. ▸ May reduce eyestrain and headaches.
Turn off the image-loading option in the web browser.	▸ Helps students who are blind and use screenreaders which cannot "read" graphics. ▸ Helps speed up searches on computers with slow modem connections.

- If keys on a standard keyboard are too small, consider using an **alternate keyboard** with larger targets. Most come with authoring software to make custom keyboards.
- If a mouse and keyboard are too confusing for a student, consider a **touch screen** for simplified direct selection.
- If neither a mouse or trackball is accessible to a student, **an electronic head pointing device with an on-screen keyboard** may work better. Or, consider using **voice-input technology**.
- If all keyboards and mouse-emulating devices are inaccessible to a student, consider the use of **scanning software** that allows the selection of characters or icons by simply hitting a **switch**.
- What if clicking on hyperlinks poses a barrier for some students? Choose a web browser that offers an option to use the "Tab" key to get to hyperlinks instead of using the mouse.

COMPUTER SPECIFICATIONS

For more information about computer specifications, check out the **U.S. Department of Education's TechPack** on the Web at: **http://www.ed.gov/offices/OSERS/whatsnew/techpack.html.**

Or, send a written request for the Tech Pack in alternate formats to:

Assistant Secretary Judith Heumann
Office of Special Education and Rehabilitative Services
Department of Education
Mary E. Switzer Building
330 C. Street, S.W.
Washington, DC 20202
Voice/TTY: (202) 205-5465

STRATEGY	BENEFITS
Use operating systems with built-in Easy Access features. ▸ **Apple System 7 or higher** ▸ **Microsoft Windows 95 or higher** ▸ **Easy Access can be added to Windows 3.1**	Flexibility of input and output features allows students with a range of abilities to use the computer more easily.
Easy Access control panels allow customization of input and output controls including:	
▸ **Executing multiple keystroke commands sequentially rather than simultaneously.**	▸ Avoids the need to hold down two keys simultaneously.
▸ **Providing keyboard alternatives to the mouse.**	▸ Helps students who find the mouse inaccessible.
▸ **Providing visual indicators of warning beeps.**	▸ Gives visual cues to students for whom warning beeps are inaudible.
▸ **Adjustment of acceptance rate for keystrokes and keyboard repeat features.**	▸ Helps avoid unintended repeats.
▸ **Adjustable font size on screen elements such as menu bars, icons and cursor track.**	▸ Makes menu bars, icons and cursor easier to find on the screen.
▸ **User-defined color and contrast.**	▸ Heightens contrast and makes text easier to read.
▸ **Macintosh features "Close View" a screen zoom function.**	▸ Provides screen magnification.
Have at least 32 megabytes of Random Access Memory or RAM.	New computer programs demand sufficient memory to run well. This is also necessary if you are adding on any access-enhancing peripheral devices. A good rule of thumb is to double the amount of memory required to run 90% of your instructional software.[2]

[2] Missouri Assistive Technology Project, Missouri Technology Center for Special Education Quicklist, September, 1996

STRATEGY	BENEFITS
Use computers with additional slots to add peripheral devices.	Computers with room to add a sound card, video card or other peripheral devices offer greater flexibility and can accommodate future unanticipated needs.
Install a sound card with text reading voice output features. **Note: Macintosh computers have enhanced voice-output capacity in the basic unit.** **Add external speakers for enhanced audio output.**	Making the computer "talk" or read aloud text written on the screen helps a broad range of end-users. ▸ Some students with low vision. ▸ Students who are learning to read. ▸ Students with dyslexia and other learning disabilities who have trouble with reading comprehension. ▸ Students who are learning English as a second language. ▸ Students with limited motor coordination who have trouble keeping their eyes focused on the computer screen. ▸ Students with short attention spans who need multiple modes of receiving information. ▸ Students in a brightly lit room with lots of glare that makes reading the computer screen difficult. ▸ Students who don't use print at all, but who comprehend spoken language.

COMPUTER SPECIFICATIONS

Two good resources for information on access standards are:

Missouri Assistive Technology Project
4731 South Cochise, Suite 114
Independence, MO 64055
Voice: (800) 747-8557
TTY: (800) 647-8558
Fax: (816) 373-9314
E-mail: matpmo@qni.com

Missouri Technology Center for Special Education
UMKC, School of Education, Room 24
5100 Rockhill Road
Kansas City, MO 64110-2499
Voice: (800) 872-7066
Fax: (816) 235-5270
E-mail: TechCtr@smtpgate.umkc.edu
Web: http://techctr.educ.umkc.edu

WHAT IF...

What if...writing text is difficult for a student? **Word-prediction software** might help. As the student begins to type, word choices are displayed from which the student can select. Some text authoring software allows the selection of pre-defined phrases as well.

STRATEGY	BENEFITS
Use a computer with a fast processor. ▸ **For PCs use at least a 486 processor running at 75 megahertz..A Pentium processor running at 200 MHz or higher is preferable.** ▸ **For Macintosh, use a machine with a 68040 microprocessor running at 75 megahertz. A Power Mac running at 200 MHz or higher is preferable.**	This is necessary to use the majority of educational software, RealAudio or any add-on devices needed. The U.S. Department of Education promotes this standard.
Use headphones.	▸ Helps students who may need to turn up the volume. ▸ Helps students filter out distracting noises. ▸ Keeps computer voice-output from disturbing others.

SUCCESS STORIES

We all learn by example, especially when it comes to computers. The stories that follow highlight successful strategies used by other teachers to integrate all of their students into usage of the Internet. These stories may help guide you in finding solutions for the students in your classroom.

But don't forget, technology is changing every day, creating new opportunities for access, as well as potential new barriers. You may identify other strategies for providing access that are different from the ones listed here. Please send us your success stories so we can learn from them and share them with others. Our e-mail address is: handbook@wid.org.

And remember, access often comes down to the creative energy and vision of teachers and technology teams who are motivated and willing to try new strategies.

Talking Tech

Deborah Fell of Urbana, Illinois, helps students with learning disabilities through the use of "talking" computers.

Planning Access For All

Ken Lentz of Haviland, Ohio, integrates special education technology into the overall technology plan for his school district.

Mentoring Magic

Susan Dudley of Carlyle, Illinois, uses e-mail and the Internet to build bridges between her students with disabilities and students at other schools.

Cool Captions

Barbara Franklin of Grants Pass, Oregon, helps deaf and hard of hearing students develop literacy skills and vocabulary with a textbook available on the Internet.

Internet Encounters

Betty Groesbeck of Hillsboro, Oregon integrates a student with a visual impairment into classroom activities using the Internet.

Cyberspace Sampler

Yuri Wellington of Hana, Hawaii, uses assistive technology to integrate students with disabilities and students for whom English is a second language.

KEY WORDS

Reading Comprehension

Print Access

Learning Disability

Visual Impairment

Did you know?

It is legal to scan copyrighted books and publications to create an alternate format accessible to students who are blind or have other disabilities. The U.S. Copyright Code says that non-dramatic literary works protected by copyright may be produced in alternate formats for exclusive use by blind people and those with other disabilities.

For more information, contact the Library of Congress Copyright Office, Voice: (202) 707-3000. On the web: **http://lcweb.loc.gov/copyright/** E-mail: copyinfo@loc.gov

BRIGHT IDEAS

Deborah has also used CD-ROMs with voice-output features. Her top two picks:

- A talking dictionary
- ACT/SAT testing preparation programs that talk out loud.

TALKING TECH

Deborah Fell

Urbana High School, 1002 S. Race Street Urbana, Illinois 61801
E-mail: fellde@cmi.k12.il.us
Grades: 9-12

"**Having Internet access has been like having a pot of gold in my classroom,**" says Deborah Fell, a special education resource teacher for students with learning disabilities at Urbana High School in central Illinois. Deborah helps her students identify the learning style that works best for them. "If students can receive information in two or three different ways, the better off they are," says Deborah. "Many of my students are auditory learners."

Deborah has found that the auditory learners in her class benefit when they can hear text spoken aloud in addition to reading it on the computer screen. She uses a variety of hardware and software to make the computers in her classroom "talk." This same technology has also helped a student with a visual impairment, whose work has improved noticeably since she started using the Web to research her homework assignments. "This student recently said she never would have tried the Internet without a large monitor and a text reader," says Deborah.

Deborah describes herself as a "techno toddler" who didn't even know how to use a computer mouse until the mid-1990's. But her curiosity and fearless attitude have served her and her students well. **"There's so much out there to discover," says Deborah, "It's like being a pioneer."**

BARRIERS	SOLUTIONS
Written text is difficult to comprehend for students with learning disabilities.	▸ Text reading software reads aloud text on the screen. ▸ Font enlargement makes the text easier to read.
Textbooks and other printed materials are often unavailable in electronic formats.	▸ Scanner with optical character recognition software converts books into electronic format. ▸ Text reading software reads aloud text appearing on the screen.
Computer screen is inaccessible to students with visual impairment..	▸ A 17-inch monitor helps with screen enlargement programs. ▸ Software enlargement programs magnify text and graphics to a greater degree than the operating system's built-in font options.

PLANNING ACCESS FOR ALL

Ken Lentz

Wayne Trace High School, 4915 U.S. 127, Haviland, OH 45851
Grades: K-12

"Always assess your needs before you get your computer hardware," says Ken Lentz, a high school computer teacher and the former technology coordinator for his school district in rural Ohio. Thinking broadly about all of the students who will use the computer to guide the planning process has helped put Ken's school district far ahead of most others.

In 1993, when Ken's district applied for a Technology Equity grant from the State of Ohio, assistive technology and special education needs were included in the original plan. As a result, specialized equipment is readily available when it's needed. For example, some of the computers at the elementary school were equipped with touch screens and alternative keyboards to make using the computers easier.

"If you can find one or two good resource people to learn about assistive technology, that's enough," says Ken, who learned about touch screens, font enlargement, "talking" software and other strategies from his own informal network of technology mentors and from reading up on it. (For guidance to more assistive technology resources, please see listings on page 18).

"Learning how to use computers as part of the curriculum is our biggest challenge," says Ken. That's why the district decided to invite motivated teachers to become peer mentors to train other teachers about computers. "Instead of sitting in a workshop where your instructor leaves at the end, our teachers are developing their skills and sharing their computer know-how with their colleagues," says Ken, "That way, the expertise stays here at the schools where it is needed."

The U.S. Department of Education is now promoting policies similar to what Ken's school district did several years ago. **Information about how to include the needs of all students into technology planning is available on the Web, with detailed pointers on technical specifications, procurement guidelines** and other policy information.

Resources:

The U.S. Department of Education's TechPack is a good resource:
http://www.ed.gov/offices/OSERS/whatsnew/techpack.html

Technology plans for the state of Ohio can be found at:
http://www.ohioschoolnet.k12.oh.us/

Technology Planning

Policy Development

Teacher Mentoring

Who's on your tech team?

Most schools entering the Information Age have technology teams to plan the computer needs for their school or district. Special Education teachers bring a valuable perspective to the technology planning process, since their students are likely to work with computers and assistive technology. If your school has a technology team, invite a Special Education teacher to participate. Chances are, their input will identify strategies to help technology work better as a learning tool for all students.

KEY WORDS

Ergonomics

Short Attention Span

Sequencing Difficulties

Memory Retention

Hand Dexterity Control

Dyslexia

Reading Comprehension

WHAT IF...

What if...Susan had a student who couldn't type? She recently discovered voice recognition software that types words as they are spoken into the computer. Voice input technology is widely available and offers even more options for computer use. It also highlights an important lesson: **Multiple ways of putting information into the computer can be just as important as multiple ways of receiving it.**

MENTORING MAGIC

Susan Dudley

Carlyle High School, 1461 Twelfth St., Carlyle, Illinois 62231
E-mail: sdudley@accessus.net
Grades: 9-12

"We use the Internet constantly," says Susan Dudley, "It's so much fun!" In fact, the Internet has attracted many general education students into Susan's special education resource room at Carlyle High School. Even though Carlyle is a small town of only 3,500, high speed telephone lines with Internet access keep the students plugged into the riches of the Internet.

"Even fun and games on the Internet can be educational," says Susan, who lets her students log on to check the latest sports scores. "Online, they read at a higher vocabulary level compared to a book that would not hold their interest," she says.

Susan also led her students in a conflict resolution project using e-mail. Students with behavioral problems acted as mentors to non-disabled junior high school students in a town several hundred miles away. "The students on the other end didn't know my students as poorly behaved or disabled," says Susan. The project helped the students in Susan's class improve their behavior by teaching them how to think critically about situations that lead to conflict and make choices about the best way to respond.

The mentoring project provided Susan's students with new responsibilities and leadership along with boosting their self-esteem – the real magic of mentoring!

BARRIERS	SOLUTIONS
The computer screen is difficult to read.	▸ Adjusting the monitor's resolution creates sharper images. ▸ Repositioning the monitor reduces glare.
Written materials are difficult to comprehend.	▸ High contrast colors of background and text improve readability. ▸ Font enlargement helps some students read written information more easily. ▸ Text reading software and books on audiotape create access for auditory learners. ▸ Highlight-and-read utilities allow the selection of words or phrases to be read aloud.
Keyboard is difficult to reach for short students.	▸ Adjustable workstations and chairs help students reach the computer.
Noisy classrooms and distracting sounds interrupt students.	▸ Headphones covering the ears block out distracting noises. ▸ Headphones giving auditory feedback from the computer provide redundancy to help students focus.
Small cursors are hard to see on the computer screen.	▸ Lower blinking speed of cursor increases visibility. ▸ Software programs increase the size of the cursor on the screen.
Complex steps involved in launching web browsers are difficult for some students to remember.	▸ Desktop icons provide shortcuts for launching programs.
Misspelled words aren't recognized by search engines on the Internet.	▸ Dictionary and spell check programs improve accuracy of searches.

WHAT IF...

What if....you have a blind student who is unable to read the computer screen at all? A screenreader and external speakers make the computer read text aloud and provide auditory prompts to help a student navigate around the screen.

- Screenreaders work best on Web sites without graphics. Turn off the image loading option on your web browser, or if you're making a web page, provide a text only version. This also helps web surfers who are using slow modem connections.
- If you're developing a web site with lots of graphic elements, make sure to provide a short description of the images for people who are unable to see them and utilize the alt-text option in your HTML programming when displaying a picture. For more information about designing accessible web pages, point your web browser to the National Center for Accessible Media at WGBH in Boston **http://www.boston.com/wgbh/pages/ncam/currentprojects/wapindex.html**
- or to the Web Accessibility Initiative **http://www.w3.org/TR/WD-WAI-PAGEAUTH**

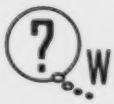
KEY WORDS

Literacy Development

Reading Comprehension

Deaf Education

English as a Second Language



WHAT IF...

What if...hyperlinks and bookmarks are difficult for some students to understand? You can create a web page that uses pictures graphics and icons instead of words to navigate the web. Check out Dusty Dutton's web page at **http://www.microweb.com/ddutton/favorites.html**.

One click on a picture of Neil Diamond links to a web site about him and further links. Dusty's mother, Donna Dutton, says the web page is simply, "a set of bookmarks linked via picture icons on Dusty's home page."

COOL CAPTIONS

Barbara Franklin

North Middle School, 1725 N.W. Highland Ave., Grants Pass OR 97526
E-mail: bfranklin@grantspass.k12.or.us
Grades: 7-9

"Students in my class are much more willing to do reading and answer questions using the Internet," says Barbara Franklin, a resource teacher of students who are deaf and hard of hearing in Grants Pass Oregon. **"They don't think they're doing reading comprehension!"**

Barbara's middle school students use the Internet to conduct research and develop their reading skills. Many of her students have difficulty with English, particularly reading and spelling. But a recently developed textbook available on the World Wide Web has helped Barbara's students learn to read and develop their vocabulary.

"Students with reading difficulties often don't like basic readers which they think of as 'baby books.'" says Barbara. She found a Website offering subjects that appeal to older students, such as sports and myths, but written at a comprehension level her students could understand. The program offers the same material at basic, intermediate and advanced levels so that students in the same class who read at different levels can still work together on the same lessons.

The reading program has also incorporated animated graphics into a **Sign Language Dictionary** to help the students develop their vocabulary. And the program also includes a Spanish language version.

Resources:

Check out the K-8 Aeronautics Internet Textbook at: **http://wings.ucdavis.edu**.

Have you noticed that Web sites are starting to talk?

Audio and video clips, even streamed audio "netcasts" are becoming more common on the Web. While this helps many blind users, it creates access barriers for users who are deaf and hard of hearing. Remember: always provide captions or a text transcript for any audio information you post on your web site. Web producers should check out SAMI, a new multimedia captioning tool from Microsoft. **http://microsoft.com/enable/products/multimedia.html**.

If you are interested in captioning in general, a good starting point is "CCWeb" at **http://www.erols.com/berke**.

INTERNET ENCOUNTERS

Betty Groesbeck

Peter Boscow Elementary School, 452 N.E. Third Ave., Hillsboro, OR 97125
E-mail: kidbmom@europa.com
Grades: Fourth

"**The Internet opens a door on the world for my students**" says Betty Groesbeck, who has used the Web to take her fourth-graders on virtual field trips to Antarctica and other points around the globe. Betty uses simple videoconferencing software for high-tech pen-pal projects with her students. "The Internet connects them to other kids in an immediate way and they love that connection," says Betty. In addition to developing communication skills, Betty says the Internet has also stimulated her students' interest in science and reading.

Over the years, Betty has taught students with a variety of disabilities, but she showed unusual ingenuity in getting one of her students with a visual impairment onto the Net. The fourteen-inch computer monitor in Betty's classroom was too small for this student to see easily, so she found a special piece of equipment to connect the computer monitor to a television with a 21-inch screen. Not only did it help her visually impaired student, but Betty also found the large TV screen made it easier for all of her students to see the computer, especially in group learning situations.

BARRIERS	SOLUTIONS
Small computer screen is hard to read for students with visual impairments. It also makes group learning difficult.	▸ An external connector routes the computer monitor to a large-screen TV set for easier viewing. ▸ Thirty students can share one computer more easily when it has a large screen.
Graphical web sites are hard to see for students with visual impairments.	▸ Screen enlargement programs make the graphics easier to see.

KEY WORDS

Visual Impairment

Group Learning

Assistive Technology Resources

Where do I start?

Betty knows that assistive technology like read-aloud keyboard programs are available... somewhere. The question is, how to find it? Most states in the U.S. have a federally funded Technology Assistance Program; there may be other local resources available too. Assistive Technology Resources including books, organizations and Websites are listed on page 18. Or check out our web handbook at: http://www.wid.org/tech/handbook/ to find even more.

KEY WORDS

English Language Acquisition

Reading Skills

Language Interpretation

Reading Comprehension

Keyboard and Mouse Use

Understanding Information

Focusing Attention

WHAT IF...

What if...you are developing a web site and want to make sure it's accessible? A free web-based service called Bobby can help. Bobby automatically evaluates your site to determine if it is accessible to disabled web surfers. It will also find problems that may keep your web page from displaying correctly on different web browsers. Go to **http://www.cast.org/bobby/** for more information.

Bobby was developed by CAST – the Center for Applied Special Technology.

CYBERSPACE SAMPLER

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E-mail: ywelling@k12.hi.us
Grades: K-12

"**The Internet provides instant gratification for students at my school,**" says Yuri Wellington, the Technology Administrator for a combined Elementary and High School in rural Hawaii. "The students get discouraged if they're looking for information and can't find it right away," she says, "But that usually doesn't happen on the Internet." Yuri's training as both a special education teacher and a technology coordinator is well matched to the needs of her school. Almost one-fourth of the students at Hana High and Elementary are in special education or other programs for special needs children. **Many of the students speak Hawaiian Creole as their first language and have to learn Standard English in school.**

Hana is a rural and geographically isolated area, and the school relies heavily on the Internet for communications. Yuri's commitment to educating and integrating students with disabilities, her passion for technology and her creative problem solving have helped make the Internet a learning tool for all students in Hana.

BARRIERS	SOLUTIONS
Mouse maneuvers like "double clicks" can be hard for young students with small hands and those with limited fine motor coordination.	▸ A trackball is easier for some students to manipulate. One of the buttons launches programs with a single click. A "lock" button keeps pull-down menus open while the student makes a selection. ▸ A device can be added that converts the standard computer screen into a touch-screen for easier navigation.
Standard keyboards can be difficult for students with limited motor coordination, memory problems or cognitive disabilities. Sometimes they hit the wrong keys.	▸ Color-coded stickers on the keyboard help students remember the function of certain keys. ▸ A keyguard placed over the keyboard provides hand support so that key choices can be intentional, not accidental. ▸ An alternative keyboard lets students work by touching large pictures instead of small keys.
Computer programs require following specific sequences to launch, creating barriers for students with limited memory.	▸ Flow charts and checklists help students follow a step-by-step process to start their work. ▸ "Macro" software can automate a series of steps, which are activated with a single keystroke.
Text-based web sites are inaccessible to students who do not speak English and some with learning disabilities.	▸ Websites with graphics, pictures, sounds and other non-textual information are easier for these students to use. ▸ Text can be copies and pasted in a talking word processor and then "read" to the student.
Time limitations on computer use make it hard for students who work slowly and need extra time to complete Web projects.	▸ Bookmarks on Web Browsers help students go back and pick up their work over a period of days or weeks. ▸ Downloading information from websites for use later also helps.

BRIGHT IDEAS

- For students who are hyperactive, working with a buddy may help them stay focused on their projects.

Have you seen?

A web site built to deliver math curriculum to students in grades 3-8 uses examples from aeronautics to provide role models for students with disabilities. The site is also accessible. Point your web browser to: **http://www.planemath.com**.

EDUCATION TECHNOLOGY FUNDING GRANTS:

Information about foundations and corporations who fund education technology initiatives can be found through the Foundation Center Library. The Center has national collections in New York City and Washington, D.C. and field offices in Atlanta, Cleveland and San Francisco, plus a network of 210 cooperating libraries in all 50 states.

Visit their web site at:

http://www.fdncenter.org

Office Locations:

National Collections:
79 Fifth Avenue
New York, NY 10003-3076
Voice: (212) 620-4230

1001 Connecticut Avenue, N.W.
Suite 398
Washington, D.C. 20036
Voice: (202) 331-1400

Field Offices:
312 Sutter St.
San Francisco, CA 94108
Voice: (415) 397-0902

1356 Hanna Bldg.
1422 Euclid Avenue
Cleveland, OH 44115
Voice: (216) 861-1934

Suite 150 Hurt Bldg.
50 Hurt Plaza
Atlanta, GA 30303-2914
Voice: (404) 880-0094

RESOURCES FOR FINDING ASSISTIVE TECHNOLOGY:

Resources for Finding Assistive Technology: Several non-profit organizations, government agencies, telephone hotlines and publications provide a wealth of information about Assistive Technology. Here are some of the best:

ABLEDATA is a national database of Assistive Technology and rehabilitation equipment. More than 23,000 products are listed. Their toll-free telephone hotline is:
Voice: (800) 227-0216
TTY: (301) 608-8912
On the web at: http://www.abledata.com

The Assistive Technology Project in your state. These programs provide information about purchasing and using accessible technology. To locate the program closest to you, contact the Rehabilitation Engineering and Assistive Technology Society of North America:
RESNA Technical Assistance Project
1700 N. Moore Street, Suite 1540
Arlington, VA 22209
Voice: (703) 524-6686
TTY (703) 524-6639
Fax: (703) 524-6630
On the Web at http://www.resna.org/resna

The Alliance for Technology Access is affiliated with 43 community technology centers across the United States that offer training and hands-on opportunities to use assistive technology. For a referral to the technology center nearest you, contact:
Alliance for Technology Access
2175 E. Francisco Blvd. Suite L
San Rafael, CA 94901-5523
Voice: (415) 455-4575
TTY: (415) 455-0491
Fax: (415) 455-0654
E-mail: atainfo@atacess.org
Or, point your web browser to: http://www.ataccess.org

The Council for Exceptional Children Technology And Media Group provides support for classroom teachers and holds an annual conference to promote the availability and effective use of technology and media for students with disabilities and/or who are gifted. Contact them at:
The Council for Exceptional Children
1920 Association Drive
Reston, VA 20191-1589
Voice: (703) 620-3660
TTY: (703) 264-9446
Fax: (703) 264-9494
e-mail: cec@cec.sped.org
Web: http://www.cec.sped.org

The Trace Center at the University of Wisconsin - Madison, has a number of technology access projects, along with comprehensive website with a wealth of information about assistive technology. Contact them at:
Trace Research and Development Center
University of Wisconsin-Madison
S-151 Waisman Center
1500 Highland Ave.
Madison, WI 53705-2280
Voice: (608) 263-6966
TTY: (608) 263-5408
Fax: (608) 262-8848
E-mail: info@trace.wisc.edu
On the Web at: http://www.trace.wisc.edu

The 1998-99 Trace Resource Book is an encyclopedic guide to software, hardware and augmentative communication equipment listing over 1,500 products. Contact information for manufacturers and prices are included in the listings. To order, contact the Trace Center, listed above, or visit http://tracecenter.org

Computer Resources for People with Disabilities: A Guide to Exploring Today's Assistive Technology by the Alliance for Technology Access is a book with a wealth of information about the process of finding information about available technology, funding strategies, resources and references. To order the book, contact The Alliance for Technology Access, listed above.

Has Technology Been Considered? A Guide for IEP Teams provides information about appropriate ways to include technology into a student's individualized education program. The book can be ordered from:
The Council of Administrators of Special Education, Inc.
615 16th Street, NW
Albuquerque, NM 87104
Voice: (505) 243-7622
Order Number AT-12

How Do I Find It?

Searching the Web can be a snap if you use the right keywords and connectors. The trick is to avoid getting overwhelmed by too much information. In general, the more specific the search terms the better the results. Use key words for a specific disability, a type of equipment, a grade level or subject rather general concepts. Put quotation marks around your terms to look for a specific combination of words. **Use the boolean connectors: and, or, not to narrow your search.** Sometimes a combination of both works best.

For example, a search for blind AND student AND screen reader using the Alta Vista search engine yielded 101,426 hits. But narrowing the search to "blind students" AND "screen reader" came back with a more manageable 43 hits.

A great search engine for beginners:

http://www.yahooligans.com/

This site features hints and a text-only option with links to schools, activities and, most importantly, a HELP page.

WEB RESOURCES:

For a complete listing of regularly updated websites relevant to students, teachers and technology administrators, check out the electronic version of this handbook posted at our website **http:www.wid.org/tech/handbook/**

Here are a few more web sites worth looking at:

EASI--Equal Access to Software and Information has a K-12 Information Technology Centre on its home page along with a wealth of information about science and math programs for students with disabilities. Visit them at:

http://www.isc.rit.edu/~easi/index.html

Do-It Disabilities, Opportunities, Internetworking and Technology features extensive links to accessible Web development resources. If you're designing a web page accessible to everyone, check out the resources at:

http://weber.u.washington.edu/~doit/

The Web Accessibility Initiative recently launched by the World-Wide-Web Consortium (W3C) is aimed at making the Web more accessible to people with disabilities. Their web page provides pointers to diverse resources as well as the latest official guidelines for creating accessible web pages.

http://www.w3org/wai

The Trace Center web page has pointers to information about web accessibility and tools to facilitate the construction of accessible web pages. Go to the web section of the category entitled "Designing a more usable world."

http://tracecenter.org

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